

Application No. 10/026,020
Amendment dated April 4, 2005
Reply to Final Office Action mailed November 3, 2004

AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. **(Currently Amended)** A vertical cavity surface emitting laser (VCSEL), comprising:

 an active region further comprising at least one quantum well having a depth of at least 40 meV, wherein said depth is defined using the difference between a valence band offset and a conduction band offset, said quantum well being comprised of InGaAsSb and barrier layers sandwiching said at least one quantum well; and

 confinement layers sandwiching said active region; and

 a compressively strained flattening layer sandwiched between a lower confining layer and the active region and that flattens a surface on which the active region is formed.
2. **(Original)** The VCSEL of claim 1 wherein said barrier layers are comprised of GaAsN.
3. **(Original)** The VCSEL of claim 1 wherein said barrier layers are comprised of GaAsP.
4. **(Original)** The VCSEL of claim 1 wherein said barrier layers are comprised of AlGaAs.
5. **(Original)** The VCSEL of claim 1 wherein said confinement layers are comprised of AlGaAs.

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6. **(Original)** The VCSEL of claim 1 wherein said quantum well is up to and including 50Å in thickness.

7. **(Original)** The VCSEL of claim 2 wherein said confinement layers are comprised of AlGaAs.

8. **(Original)** The VCSEL of claim 7 wherein said quantum well is up to and including 50Å in thickness.

9. **(Original)** The VCSEL of claim 3 wherein said confinement layers are comprised of AlGaAs.

10. **(Original)** The VCSEL of claim 9 wherein said quantum well is up to and including 50Å in thickness.

11. **(Original)** The VCSEL of claim 4 wherein said confinement layers are comprised of AlGaAs.

12. **(Original)** The VCSEL of claim 11 wherein said quantum well is up to and including 50Å in thickness.

13. **(Previously Presented)** The VCSEL of claim 1 wherein said at least one quantum well further comprises >1% N.

14. **(Original)** The VCSEL of claim 13 wherein said quantum well is up to and including 50Å in thickness.

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15. (Original) The VCSEL of claim 13 wherein said barrier layers are comprised of GaAsN.

16. (Original) The VCSEL of claim 15 wherein said quantum well is up to and including 50Å in thickness.

17. (Original) The VCSEL of claim 13 wherein said barrier layers are comprised of GaAsP.

18. (Original) The VCSEL of claim 17 wherein said quantum well is up to and including 50Å in thickness.

19. (Original) The VCSEL of claim 13 wherein said barrier layers are comprised of AlGaAs.

20. (Original) The VCSEL of claim 19 wherein said quantum well is up to and including 50Å in thickness.

21. (Original) The VCSEL of claim 13 wherein said confinement layers are comprised of AlGaAs.

22. (Original) The VCSEL of claim 21 wherein said quantum well is up to and including 50Å in thickness.

23. (Original) The VCSEL of claim 15 wherein said confinement layers are comprised of AlGaAs.

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24. **(Original)** The VCSEL of claim 23 wherein said quantum well is up to and including 50Å in thickness.

25. **(Previously Presented)** The VCSEL of claim 17 wherein said confinement layers are comprised of AlGaAs.

26. **(Original)** The VCSEL of claim 25 wherein said quantum well is up to and including 50Å in thickness.

27. **(Original)** The VCSEL of claim 19 wherein said confinement layers are comprised of AlGaAs.

28. **(Original)** The VCSEL of claim 27 wherein said quantum well is up to and including 50Å in thickness.

Claims 29, – 44 **(Cancelled)**.

45. **(Previously Presented)** A vertical cavity surface emitting laser (VCSEL), comprising:

an active region further comprising at least one quantum comprised of material including InGaAsSb and greater than 1 % nitrogen, said at least one quantum well having a depth of at least 40 meV, wherein said depth is defined using the difference between a valence band offset and a conduction band offset, and barrier layers sandwiching said at least one quantum well; and

confinement layers sandwiching said active region; and
a compressively strained flattening layer sandwiched between a lower confining layer and the active region and that flattens a surface on which the active region is formed.

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46. **(Previously Presented)** The VCSEL of claim 45 wherein said barrier layers are comprised of GaAsN.

47. **(Previously Presented)** The VCSEL of claim 45 wherein said barrier layers are comprised of GaAs and at least one of P and Al.

48. **(Previously Presented)** The VCSEL of claim 45 wherein said confinement layers are comprised of AlGaAs.

49. **(Previously Presented)** The VCSEL of claim 46 wherein said confinement layers are comprised of AlGaAs.

50. **(Previously Presented)** The VCSEL of claim 47 wherein said barrier layers are comprised of AlGaAs.

51. **(Previously Presented)** The VCSEL of claim 48 wherein said barrier layers are comprised of GaAsN.

52. **(Previously Presented)** The VCSEL of claim 48 wherein said barrier layers are comprised of GaAs and at least one of P and Al.

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53. (Currently Amended) A vortical cavity surface emitting laser (VCSEL), comprising:

an active region further comprising at least one quantum comprised of material including InGaAsSb and greater than 1 % nitrogen, said at least one quantum well having a depth of at least 40 meV, wherein said depth is defined using the difference between a valence band offset and a conduction band offset, said quantum well including thickness up to and including 50A, and barrier layers sandwiching said at least one quantum well; and

confinement layers sandwiching said active region; and
a compressively strained flattening layer sandwiched between a lower confining layer and the active region and that flattens a surface on which the active region is formed.

54. (Previously Presented) The VCSEL of claim 53 wherein said barrier layers are comprised of GaAsN.

55. (Previously Presented) The VCSEL of claim 53 wherein said barrier layers are comprised of GaAs and at least one of P and Al.

56. (Previously Presented) The VCSEL of claim 53 wherein said confinement layers are comprised of AlGaAs.

57. (Previously Presented) The VCSEL of claim 54 wherein said confinement layers are comprised of AlGaAs.

58. (Previously Presented) The VCSEL of claim 55 wherein said confinement layers are comprised of AlGaAs.

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59. **(Previously Presented)** The VCSEL of claim 56 wherein said barrier layers are comprised of GaAs and at least one of N, P and Al.